CLAIMS

1. Manufacturing method for permanent magnets of the ferrite type comprising a magnetoplumbite phase of formula $M_{1-x}R_xFe_{12-y}T_yO_{19}$ in which M = Ba, Sr, Ca or Pb, R =Bi or other elements of the rare earths family, T =Mn,Co,Ni,Zn, with x and y comprised between 0.05 and 0.5 in which:

a1) one forms in a mixing means, typically a mixer (3) operating by batch, a pulverulent mixture MP of raw materials related t the elements M, R, Fe and T, typically under the form of oxide, carbonate or hydroxide, comprising water in a predetermined quantity, typically necessary for the formation of granules in the subsequent stage,

a2) next one transforms, typically in a granulator (4), said mixture into green granules A, with a possible addition of extra water,

b) said green granules are calcinated in a calcination furnace (5) to form a clinker B, with a magnetoplumbite phase base of formula $M_{1-x}R_xFe_{12-y}T_yO_{19}$,

c) one carries out a wet grinding of said clinker, typically in a dispersion apparatus (6) in aqueous medium, to obtain a homogeneous dispersion C of fine de-agglomerated particles of average particle size less than 1.2 µm,

d) one concentrates and compresses said particles under an orienting magnetic field to form a green compact D, anisotropic, able to be manipulated and of predetermined shape,

e) one sinters said anisotropic green compact D to obtain a sintered element E,

f) one possibly dimensions the final size of said sintered element E, typically by machining, a method characterised in that:

1) at stage a1) of the method, one forms said mixture MP, by introducing into said mixing means (3), a dry mixture MS of powders corresponding to said raw materials relative to the elements M and Fe, typically formed in a dry mixer (1), and a homogeneous fluid dispersion DF of said raw materials relative to the elements R and T typically in said pre-determined quantity of water, formed typically in a dispersion apparatus (2);

2) at stage b) of the method, said green granules A are calcinated at a chosen temperature and for a chosen length of time,

in such a way as to obtain, at the exit from the calcination furnace (5) at the end of stage b), a clinker B which is both homogeneous in chemical composition and size, and of low apparent density, comprised between 2.5 and 3.5 and which can be ground easily during stage c).

2. Method according to claim 1 in which said fluid dispersion comprises:

- water: 55 to 85% by weight
- element R (expressed in oxide form): 10 to 30% by weight
- element T (expressed in oxide form): 5 to 15% by weight.

3. Method according to one or the other of claims 1 or 2 in which said fluid dispersion DF comprises a deflocculating agent or dispersing agent, in such a way as to obtain a dispersion with both low viscosity and a state of fine dispersion, the average sizes of the

particles or agglomerates relative to elements R and T being less than 25 µm.

4. Method according to claim 3 in which said fluid dispersion DF comprises said deflocculating or dispersing agent with a weight content comprised between 0.5 and 2%.

5. Method according to any one of claims 1 to 4 in which one introduces into said mixer (3), said dry mixture of powders MS and said fluid dispersion DF, 0.1 to 0.2 litres of said fluid dispersion DF being introduced per kilogram of said dry mixture MS.

6. Method according to any one of claims 1 to 5 in which, at stage b), said calcination is carried out at a temperature and for a length of time chosen in order to obtain a clinker B of apparent density d_a ranging from 2.7 to 3.1.

7. Method according to claim 6 in which said calcination is carried out at a temperature and during a length of time chosen in order to obtain a clinker B of apparent density d_a ranging from 2.75 to 3.

8. Method according to any one of claims 1 to 7 in which one chooses the elements M, R, T and the values x and y in such a way that, at the end of stage b), said clinker B has a value of field of anisotropy Ha at least equal to 1592 kA/m at 20°C.

9. Method according to claims 8 in which one chooses the elements M, R, T and the values x and y in such a way that, at the end of stage b), said clinker B has a value of field of anisotropy Ha at least equal to 1671 kA/m at 20°C.

10. Method according to any one of claims 1 to 9 in which one chooses M=Sr, R=La and T=Co in the formula $M_{1-x}R_xFe_{12-y}T_yO_{19}$.

11. Method according to any one of claims 1 to 10 in which one chooses x=y in the formula $M_{1-x}R_xFe_{12-y}T_yO_{19}$.

12. Method according to any one of claims 1 to 11 in which x and y are comprised between 0.10 and 0.35.

13. Method according to claim 12 in which x and y are comprised between 0.15 and 0.25

14. Method according to any one of claims 1 to 13 in which, at stage d), said particles are compressed under a pressure of 30-50 MPa under an orienting magnetic field of about 1 Tesla.

15. Method according to any one of claims 1 to 14 in which:

1) one provides a clinker B' of formula $MFe_{12}O_{19}$,

2) one mixes it with said clinker B of the formula $M_{1-x}R_xFe_{12-y}T_yO_{19}$, typically during said stage c), in such a way as to obtain permanent magnets at lower cost and with a better performance/price ratio.

16. Method according to claim 15 in which the weight proportion z of clinker B of the formula $M_{1-x}R_xFe_{12-y}T_yO_{19}$ in the mixture of the two clinkers B and B' is comprised between 0.20 and 0.80.

17. Method according to claim 16 in which the weight proportion z is comprised between 0.30 and 0.70.

18. Method according to any one of claims 15 to 17 in which said clinker B' of the formula $M Fe_{12} O_{19}$ has an apparent density d_a comprised between 2.5 and 3.5.

19. Method according to any one of claims 1 to 18 in which stage b) of calcination is piloted, particularly as far as the calcination temperature is concerned, by measuring the apparent density d_a of the clinker obtained at the end of this stage b).

20. Method for manufacturing a ferrite powder by the method for manufacturing permanent magnets

according to any one of claims 1 to 14 in which, at the end of stage b), said clinker B is reduced into powder, and in which the following stages c) to f) are suppressed.

21. Permanent ferrite magnets obtained by the method according to any one of claims 1 to 19.

22. Permanent magnets according to claim 21 with a field of anisotropy at least equal to 1711 kA/m.

23. Permanent magnets according to claim 22 with a field of anisotropy at least equal to 1751 kA/m.

24. Permanent magnets according to claim 3 with a field of anisotropy at least equal to 1791 kA/m.

25. Motors comprising magnets according to any one of claims 21 to 24.